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Victor R. Savage
National University of Singapore

Lily Kong
Singapore Management University, lilykong@smu.edu.sg

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URBAN CONSTRAINTS, POLITICAL IMPERATIVES: ENVIRONMENTAL 'DESIGN' IN SINGAPORE

Victor R. Savage and Lily Kong

Department of Geography

National University of Singapore

INTRODUCTION

Cities are by origin, nature and development unecological entities. As artifacts of human endeavour, cities are engineered landscapes developed for human comfort, activities and interests. The city is the most pronounced expression of the divorce between humans and nature. It epitomises human intervention in nature, and represents the separation of humans from natural processes (Williams, 1980:74-6). While agrarian communities follow the rhythms of nature and remain in relative harmony with nature, urban communities beat to a different rhythm -- a rhythm of technology, economics and human activities. By definition, the city is a landscape of social and human power:

> Cities are specialized nodal agglomerations built around the instrumental 'presence availability' of social power. They are control centres, citadels designed to protect and dominate through what Foucault called "little tactics of the habitat", surveillance, partitioning, social discipline and spatial differentiation (Soja, 1989:153).

As human societies have become increasingly urbanised, the separation between human societies and nature seems to be increasingly spinning out of control.

Analysis of cities must include a macro as well as micro perspective of their development and relationships. From a macro viewpoint, consideration must be given to the broader hinterland within which the city is situated because development and growth of cities depend largely on the resources of their hinterland. The fundamental principle at work is that the size, nature and wealth of the hinterland supports the urban population. All the gut subsistence of the city -- food, water, energy -- is found outside its boundaries and these are by and large environmental goods. As a result, cities cannot be understood as viable systems unless a broader ecosystem approach is

applied. For many cities, the immediate and subsistence hinterland falls within state boundaries. However, the rise of 'global' cities has made the equation between city and hinterland more difficult to define. Global cities are reliant today on a global hinterland rather than their immediate national hinterlands.

At a micro-level, the development of cities themselves entails the creation of cultural landscapes; it is at the same time the witting and unwitting creation of new environments. These environments are unfortunately and ironically not always conducive to human life, health and subsistence. We are confronted around the world by the spectre of air pollution, acid rain, smog, water shortages and garbage disposal problems in cities. These are problems that are likely to accelerate in the Third World with increasing urbanisation.

Given the global and regional urban environmental scenarios, our intention in this paper is to demonstrate why it is necessary for governments to address urgently their urban environmental problems. We advocate here the need to go back to an understanding of basic human and urban ecological principles. Because of the complexity of the urban ecosystem, we contend that there can be no solutions to the problems of urban ecosystems unless the issues are adopted by national governments and urban administrations. Enlightened elites and decision makers and firm government are the only ways to ensure the successful management and sustenance of viable urban ecosystems. To illustrate the veracity of this statement, we have used Singapore as our case study because as a city in the tropical belt of Third World states it is often hailed as a model of successful urban development and environmental management. In particular, we will discuss the environmental balance sheet in post-Independence Singapore and offer explanations as to why the ecosystem remains viable

despite every potential for degradation with rapid urbanisation and industrialisation.

THE SINGAPORE EXPERIENCE: URBAN AND ENVIRONMENTAL PLANNING

While critics point to some problems, the overall assessment of Singapore's urban ecosystem remains commendable, largely because political enlightenment has ensured that effective measures have been taken to maintain a certain degree of eco-balance. This political enlightenment is clearly evidenced in the establishment of the Ministry of Environment in 1972 -- testimony of the government's early recognition of the environment as a national issue. It is especially significant because few countries in the world at that point of time had Ministries or government administrations dealing with environmental issues. Specifically, in 1972, only ten countries in the world had some sort of organised environmental administration (Simonis, 1986:1).

What has this committed political perspective meant for Singapore in concrete terms? In the rest of this section, we will focus on the post-Independence years (1965 till the present) and examine the record of environmental changes on three fronts. First, we will deal with the nature of environmental changes during this period -- the cleaning up and greening of landscapes, the massive degree of planning and the resultant rapid creation of a built-up landscape. Second, we will focus on the ways in which these changes have been made possible: the continuing social education and engineering of social behaviour and attitudes regarding environmental issues through mass media campaigns and legal binds. Third, we will examine the beginning and in some ways overdue consciousness of the value of nature conservation, both on land and in the sea.

i)Environmental change: Planning the Garden City

Environmental change in Singapore in the post-Independence years has entailed the exercise of planning muscles and the shaping and implementation of environmental policies to realise political visions. Primarily, two directions can be identified -- the eradication of pollutive and unhygienic landscapes on the one hand, and relatedly the creation of a "clean and green" city. These goals form part of a larger commitment of the government to the creation of a viable urban ecosystem, a commitment that can almost unabashedly be labelled a political culture of ecological consciousness. This commitment is evident in the way in which specific government ministries and statutory boards are charged with the responsibility of changing and protecting the environment to achieve political visions. For example, the Ministry of the Environment plays a significant role in addressing problems of solid waste, air and water pollution, industrial water production, sewerage, drainage, environmentally hazardous chemicals, and public hygiene. The Ministry of National Development in turn is responsible for changes in the environment in the form of urban renewal and development, public housing, public works, parks and recreation, construction industry development, planning and development control, building control, land development and building conservation, amongst others.

To eradicate pollutive and unhygienic landscapes, the government on assuming the political mantle, set about clearing slums and squatter settlements. These efforts were concentrated largely in the Central Urban Area where congestion was most severe and conditions most appalling. The Urban Renewal Department of the Housing and Development Board (HDB) embarked on a comprehensive scheme for redevelopment, including the demolition of old shophouses and the relocation of families and

businesses. This work was carried on by its succeeding body, the Urban Redevelopment Authority. Concomitant with clearance and demolition, new homes were constructed for the homeless and the relocated (Teo and Savage, 1991). Since 1960, the HDB has been responsible for the creation of totally new manageable environments in the form of public housing satellite towns which have by now become distinctive signatures of Singapore's landscapes. There are few, if any, existing problems with slums and squatter settlements. Along with the clearance of slums and squatters and the provision of public housing, other improvement schemes include the construction of hygienic hawker and food centres, the clearing out of pollutive activities and the cleaning up of rivers. The cleaning up of Singapore River is one example of a project that encompasses all these various actions. It involved phasing out pollutive activities such as pig and duck farming, the resettlement of squatters, backyard trades and industries and farmers contributing to the pollution of the river, and the relocation of street hawkers to hawker centres, apart from the actual cleaning up of the river itself.

To create a clean and green city, the Garden City Concept was introduced in 1965 to guide planning and development of an island with abundant greenery. This was to be achieved through the large scale planting of trees and shrubs all over the island, which complemented the annual Tree Planting Day, initiated in 1963 by the then Prime Minister Mr Lee Kuan Yew (Parks and Recreation Annual Report, 1962-63). All these activities were facilitated because the necessary support was made available. Large sums of money have been spent to achieve the visions of a clean and green city, relatively free from environmental degradation. For example, the government's commitment to maintain and develop Singapore's tropical nature is seen in the fact that in 1989 alone, S$27.76 million[1] were spent on maintaining and developing greenery

[1] At the time of writing, the exchange rate was US$1/- to S$1.61.

(The Straits Times, 25/12/90:18). Large amounts of money have also been spent cleaning up the Singapore and Kallang River water catchments, for example, in extending the sewerage system and redeveloping rundown areas (Ministry of Environment, Annual Report, 1980:16). Administrative structures and adequate legal support in the form of the large number of legislations passed and amended (Appendix 1) have also been put in place.

The policies and actions to realise this vision of a clean and green city have become more radical and ambitious with time. For example, the cleaning up of the unhygienic slum environments in the Central Area was taken to an extreme in the early 1980s when the shophouse dwellings typifying these environments were indiscriminately demolished. It was only in the late 1980s that government and planners woke up to the importance of conservation, which has now become the buzz word in government and public reports and debates. This increasing attention given to conservation will be discussed more fully in a subsequent section.

In any evaluation of environmental change in Singapore, it is clear that the underlying basis is the government's firm belief in rational judgements, efficiency, pragmatism, science and technology. These beliefs are manifested in all the planning blueprints and reports where a high premium is placed on allocative efficiency and order (Kong, 1991:146-7). These alone have been the guiding principles leading to Singapore's environment as it is today.

ii) Societal Change: The Fine City

How have these major urban environmental changes been possible in

Singapore? After all, planning blueprints and government bodies exist as well in other countries though without necessarily achieving the same effects. Primarily, it is because social attitudes and behaviour have been the target of a significant degree of engineering. On the one hand, there have been many attempts to inculcate in Singaporeans environmentally friendly attitudes. At the same time, regulation and direct controls using legal and fiscal measures have also been implemented.

Tyabji (1991:18) suggests that moral suasion has been one of the policy instruments employed to prevent environmental degradation. This in fact involves government attempts to inculcate in Singaporeans a sense of environmental consciousness, appealing to their sense of social responsibility and to their communitarian values. The range of activities to this end is mind-boggling. Singapore has been touted the country of a million dust bins and the many cleaning and greening campaigns have attracted international media attention: tree planting, no littering, no spitting, no killer litter, flush the toilets, no smoking, use the dust bins, and more recently, the banning of chewing gum. These campaigns have been accompanied in many instances by stiff fines.

As a specific example, "Clean and Green Week" was introduced on an annual basis in November 1990. Mr Goh Chok Tong, then the first Deputy Prime Minister, suggested that while Tree Planting Day has taught Singaporeans how to appreciate greenery, this appreciation must also be broadened to include the environment, which he defined as "all surroundings affecting human growth". The target groups in this campaign include schools, grassroots organisations and the business community. Activities range from the formation of ecology gardens in school compounds; cleaning up of beaches or parks; sprucing up of markets and hawker centres; recycling of

materials and water and energy conservation (for example, the initiation of a waste recycling project by Redhill Town Council); and talks on nature. In all these activities, the attempt is to appeal to communitarian values. As the Environment Minister, Dr Ahmad Mattar put it, the responsibility of looking after the environment is a collective effort that requires all Singaporeans to do their bit. If nothing else, Clean and Green Week aimed to help build a nation of socially responsible people (Speeches '90, September-October 1990:33-37).

Other measures to educate the public and to sensitise Singaporeans to urban environmental problems and their solutions include talks and exhibitions. For example, the Ministry of Environment conducted a series of talks in 1991 about environmental conservation, covering topics such as the use of unleaded petrol and catalytic convertors; local and global environmental issues; and food-borne diseases (The Straits Times, 3/3/91:16). Recently, Singapore hosted a first exhibition on the environment -- Enviroworld '91 (June 27-June 30 1991) -- which aimed to educate the industrial sector, policy makers and the public on how to protect the environment, for example, how to reduce wastage, reuse and recycle materials in the office and home. A National Council on the Environment has also been set up by the Ministry of the Environment (The Straits Times, 15/3/91:28) to promote a clean and green Singapore by encouraging environmental awareness through the business community and other channels. Other non-governmental organisations have also engaged in environmentally friendly activities as well as in activities to promote such attitudes among the public. Commercial groups like hotels (Marina Mandarin), fast-food outlets (McDonald's), shopping centres (Forum Galleria), banks (Hong Kong and Shanghai Bank), and petroleum companies (British Petroleum) have all introduced environmentally friendly products and/or packaging or actively encouraged such attitudes through educational

channels (The Straits Times, 22/4/91:20; 23/4/91:26). Likewise, schools have also embarked on environmental education in various ways. The Raffles Girls' School, for example, organised a Cleanathon on Earth Day 1991, combing East Coast Park for litter. Students have also been encouraged to create poems, pledges and cheers for the day (The Straits Times, 22/4/91:20).

The effects of these recent concerted efforts at moral suasion, if successful, would be to cultivate in Singaporeans a "culture" of environmental consciousness and responsibility. However, as Dr Ahmad Mattar pointed out, Singaporeans have up till now not acted out of any genuine concern for the environment (Speeches '90, September-October 1990:33-37). Efforts at inculcating such a consciousness therefore need to be stepped up. In the meantime, successful environment management in the short term cannot depend on individual conscience. Instead, in Singapore, regulation and direct controls have been adopted.

In many areas, these controls have been most effective in achieving environmentally-friendly goals, thus keeping the urban ecosystem in balance. One of the earliest examples of such action is the control over air pollution. The Clean Air Act of 1971 stipulates that emission levels from factories and other stationary sources must be kept within the standards set for various air pollutants. To enforce these rules, written permission from the Anti-Pollution Unit (APU) is needed to occupy premises which are sources of pollution; alterations and extensions to manufacturing plants also require written permission. The APU also screens applications for the setting up of new factories in the Republic and the proper siting of industrial establishments. If a factory is too pollutive or the location of the factory is not compatible with surrounding land use, approval will not be given. In addition, there are routine inspections and spot

checks on pollutive industries. Similarly, control over air pollution from mobile sources, primarily motor vehicles is also exercised. Control over the lead content of petrol is a good example. In July 1981, the acceptable lead content was set at 0.6 gm/l; this was reduced to 0.4 gm/l in January 1983, and 0.15 gm/l in June 1987 (Chia and Chionh, 1987:131). This paved the way for the implementation of the February 1991 new petrol tax structure that made unleaded petrol cheaper than leaded petrol and hence ushered the era of unleaded petrol in Singapore. Furthermore, from January 1982, cars that are three to ten years have to pass a vehicle examination every two years and cars over ten years have to pass this examination every year before road tax licences can be renewed. These examinations ensure that carbon monoxide and smoke levels are within set limits (Chia and Chionh, 1987:131).

In the case of water pollution, fines of up to S$5,000 may be imposed for the discharge into a water course trade effluent which does not meet the minimum standard of quality prescribed. Any vessel that discharges oil or mixture containing oil into Singapore waters is liable to a fine of S$500,000 or imprisonment for a term not exceeding two years or both; any vessel or person to discharge or throw any refuse or other waste matter, or trade effluent into Singapore waters is liable to a fine of up to S$10,000 or imprisonment for a term not exceeding two years or both (Prevention of the Pollution of the Sea Act, 1971).

In line with current global concerns over the ozone layer, a ban has been slapped on CFC (chlorofluorocarbon) aerosol products with effect from 5 February 1991 with the exception of pharmaceutical products. The Trade and Development Board has set up a tender and quota system to control the consumption of controlled CFCs since 1989 (The Straits Times, 15/3/91:28). The import and making of polystyrene sheets has also

been banned (The Straits Times, 6/2/91:3). In the spirit of direct control, the import of mercuric oxide batteries has been stopped from 1 January 1992 and existing stocks will have to be sold before 1 June 1992. These batteries can then only be used for special medical equipment such as hearing aids. From 1 June 1992, zinc carbon batteries and alkaline ones, commonly used for household electrical items, will be required to have no more than a limited amount of mercury, which is toxic and can hence pose a threat to the environment (The Straits Times, 29/6/91:22).

The vast array of rules and regulations require significant enforcement measures. The "fine city" relies on a bureaucratic network to do this and Singapore owes its administrative efficiency in policy implementation to the increased powers vested in the administrative and bureaucratic sector. Indeed, so enlarged are the boundaries of their power that

> administrators do not merely serve, they also wield decision-making power without the mandate. In Singapore, the division between the administrator and the politician is particularly blurred because it is unstated official policy to politicize the administrators and to entrust them with major power in decision-making in the government enterprises (Chan, 1975:63).

Thus, in this context, administrators are as much engaged in formulating policies directed at the environment as they are in implementing them.

iii) Environment City: Nature Conservation

With 50 percent of the country's land area built up, there is a danger that the island-scape could resemble any other metropolitan setting anywhere else in the world. The government has expressed concern that Singapore should keep part of its

landscape identity and this is reflected in their current emphasis on trying to preserve parts of Singapore. This interest in conservation has focused on two areas. The first is restoring and preserving parts of old Singapore -- monuments and buildings (such as the old Saint Joseph's Institution and the Telok Ayer Market), and areas with distinctive character (such as Chinatown, Little India and Kampong Glam). The second is the conservation of natural landscapes, and this has received tremendous impetus from the instigation and pressure of the Singapore Nature Society (formerly Malayan Nature Society, Singapore Branch). With endorsement from Professor Tommy Koh, Ambassador-at-large and Director of the Institute of Policy Studies, the Society put forward their Master Plan for the Conservation of Nature in Singapore (Briffett, 1990) for government consideration.

The objectives of the proposal were to document the state of the natural environment in Singapore and to suggest ways of conserving habitats and wildlife for the benefit of future generations. This consciousness of the importance of Singapore's natural heritage has been taken up by the government in several ways. In the new Concept Plan[2] (1991), the vision of life in the next lap is one where the island has

> ... an increased sense of "island-ness" - more beaches, marinas, resorts and possibly entertainment parks as well as better access to an attractive coastline and a city that embraces the waterline more closely as a signal of its island heritage. Singapore will be cloaked in greenery, both manicured by man and protected tracts of natural growth and with waterbodies woven into the landscape (Living the Next Lap, 1991:4).

[2] The first Concept Plan grew out of a 1967 State and Planning Project which studied land use and transportation needs with the aim of drawing up long-range plans and land allocation and development. It acted as an advisory document to guide infrastructural and land use developments such that land could be allocated to major uses according to estimated needs. In 1991, a new Concept Plan was drawn up to reflect changing needs and conditions.

To achieve such a vision, one of the major tools to be used is the Green (foliage) and Blue (water) Plan (Figure 1) which aims to weave together a system of open spaces that complement waterways. These open spaces include major parks and gardens, sports and recreation grounds, natural areas (mangrove swamps, nature reserves), boundary separators (green belts between urbanised areas), internal greenways and connectors which define neighbourhoods and precincts, military training areas and agricultural land. The idea is eventually to create a Garden City which is urbanised and industrialised and yet environmentally friendly with sufficient open green spaces.

Creating a landscape "so entwined with tropical greenery that it gives the illusion of a city that has sprung out of a garden" (Living the Next Lap, 1991:28) is not aimed only at the local population. The natural assets of the country are increasingly receiving recognition as potential tourist draws which should therefore be conserved. Indeed, the Singapore Tourist Promotion Board has begun to sell Singapore as "one of only two cities in the world to have a genuine rainforest", an island of "beaches and wildlife" and a place where the tourist can experience the "traditional rural charms" of offshore islands amidst a natural setting (The Straits Times, 16/8/91:16; Waller, 1990). In fact, the Singapore Nature Society estimated that more than 25 per cent of Singapore's tourists would be "eco-tourists" and that the extra days tourists would spend in "nature-related activities" could boost tourist-derived income significantly (Briffett, 1990:4).

Apart from the emphasis on natural environments for a better quality of life for Singaporeans and for tourist revenue, all the promotional and planning activities in this direction form part of a larger concern with *heritage* issues in Singapore. Specifically, the notion of natural heritage is emphasised alongside that of cultural and historical

heritage. Our earlier observation that conservation in Singapore currently encompasses both the restoration and preservation of old Singapore and natural landscapes reflects this interest. In turn, the spotlight on heritage is part of a larger intent: that Singaporeans develop an identity and sense of belonging. Part of this identity, it is hoped, could derive from the recognition of a shared past and heritage.

This recognition of the value of Singapore's natural heritage does not however imply that development will henceforth play second fiddle. Where it is felt that conserving a natural area yields less benefits than the development of that area, pragmatic and economic considerations still take precedence. For example, requests have been put to the Ministry of National Development to reconsider the destruction of Kranji marshes for development in 1984 and 1990 and to protect the area as a nature reserve. Various development claims include Singapore Telecom which plans to have transmitting stations there; Singapore Broadcasting Corporation (SBC) which intends to put in transmission towers; and the Public Utilities Board waterworks associated with Kranji Reservoir. The Ministry's response was that the substantial costs and the land constraints made it impractical to retain the area and specifically the heronry which takes up five hectares of the area marked out for SBC's use (The Straits Times, 15/10/90:21).

EXPLAINING SINGAPORE'S VIABLE ECOSYSTEM

Charting the ecological balance sheet for Singapore begs the question of *why* Singapore's urban ecosystem has managed to sustain a satisfactory, albeit less than perfect balance sheet. As in any analysis of human activities and decision making, it is

difficult to identify independent variables; we can only suggest that several factors acting simultaneously explain Singapore's sustainable urban ecosystem. These stem from a certain degree of political enlightenment which recognises the constraints that Singapore faces and the need to deal with them at national level. These multi-variate factors can be grouped under three broad themes: i) physical geography and spatial contraints; ii) economic viability as a city state; and iii) leadership and institutional culture.

i) Spatial constraints: ecosystem realities

Urban nodes are specific spatial constructs; their accessibility and transportation efficiency define the extent of their population agglomerations. Given available transportation technologies, most cities have at least some latitude for expansion because they fall within wider national territories. Singapore's situation is however quite atypical. As a city state, the state's boundaries and the urban limits are the same. In fact the main state/urban area is further defined by the size of the island of Singapore. In this context, Singapore's land area is a given; unlike other urban agglomerations the city has no ability for substantial spatial expansion. We must however hasten to add that the Singapore government through land reclamation projects have added a further ten per cent (nearly 6,000 hectares) to its land area between 1960 and 1991. While Singapore measured 587 sq km in 1967, by 1991 it was 626 sq km. In the next couple of decades, another ten per cent of land area will be further added through land reclamation.

These exacting and finite state and urban boundaries are both a blessing and a limitation for Singapore. On the plus side the government is spared the misery of facing

problems arising from rural-urban migration, the plague of many Third World countries and a major reason for the overtaxing of their urban systems and the breakdown of human-environment relationships. There are no problems of primacy, nor of a rural sector that is lagging behind in terms of economic development. In addition, as a city state, there is only one level of government involved. As such, urban policies are at the same time national policies, and one level of administration makes for easier management. Furthermore, as a city-state, there are no real problems of regional differences and disparities, unlike the scenario in larger, more disparate countries like Indonesia and Brazil. As a global city, Singapore is fortunate not to have the problems associated with a rural hinterland, and yet is able to enjoy the benefits of one because the world acts as Singapore's hinterland (Rajaratnam, 1972). On the negative side, Singapore is unable to expand in any direction. Population has to be controlled and effectively managed to ensure that life is not too crowded and congested, and continues to flourish. Without a hinterland and natural resource base means that there is greater pressure in the attempt to ensure the viability (defined economically and politically) of the population. This onus falls not only on the government and its institutions, but also on the people.

The spatial constraints and the variable growing population have clearly been two foremost considerations in the government's calculation of Singapore's human-environment equation. This is evident in its two-prong approach to urban development and potential environmental problems. The first addresses the population side of the equation whereby a ceiling has been set for Singapore's population size. In its earlier plans, it was set at about 3.5 million; in the recent 1991 Concept Plan, the authorities are talking of a population ceiling of 4 million. The increasing population is translated in population densities as follows: 3,400 (1967); 4,800

(1990) and 6,500 (possibly 2030?) per square kilometre. The sensitivity to population limits was the major motivation in the government's very successful albeit draconian family planning policies in the 1960s and 1970s. In fact so successful has family planning been in bringing down fertility that at current population growth rates, Singapore's population will be dwindling -- a cause that has been of much recent political concern. Hence, since the mid-1980s, the then Prime Minister Lee Kuan Yew has launched a reversal of population policies, this time to increase population growth rates.

Second, the population-spatial area equation has made planning a sine qua non in Singapore's development. The government, mindful of the country's spatial constraints and lack of natural resources leaves nothing to chance. So well aware of the need for planning are they that Singapore is perhaps one of the world's most planned cities. This is necessary in their view because Singapore has little margin for experimentation and error, a message that has consistently been repeated to the public. As the Minister for Law and Home Affairs pointed out,

> The truth is that nothing happens to Singapore by chance; every step Singapore has taken towards economic growth, stability and prosperity, the overcoming of obstacles, have been through wise management and careful decisions by the government and its dedicated leaders with the cooperation of a responsive people. So too will it be for the future. Nothing can be taken for granted (Jayakumar, 1982: Vol 6(4):71-2).

The planning juggernaut has paid particular attention to the efficient and effective use of limited space. While in the earlier phase of planning, the concern was mainly with the functional aspects of life (housing, transport, reservoirs), the 1991 Concept Plan has been a tour de force in the government's planning policies. With increasing per capita GNP and rising standards of living (March 1992 per capita GNP:

US$13,600), this new plan has given greater emphasis to the *quality* of life, which has been translated into the provision of more open spaces and green areas, the encouragement of participation in recreational activities, the conservation of old areas in the city centre, and the conservation of natural areas. More important, the Concept Plan, a blue print for the twenty-first century neo-utopian city of excellence, has been open to public debate and involvement. Unlike earlier plans, the Concept Plan has tried to find a happy medium of top down and grassroots contributions to the development of Singapore's city of excellence.

ii)Economic viability: the ideology of survival

Ever since independence, there has been a tremendous emphasis on achieving economic growth. In the early days, this had added urgency because communism threatened and the view was that economic unhappiness led to political instability and communist insurgence. The government was of the view that primary, if not sole, attention had to be paid to encouraging economic growth because it was only with economic progress that the survival of a population could be assured. Much was made of the ideology of "survival". Whereas in purely ecological terms, survival hinged on a subsistence existence with adequate food and shelter, in urban societal terms, it entailed the attainment of economic viability. Then, the official view was that Singapore's economic viability depended on several conditons: a multi-racial ideal, a tightly-organised society, a commitment to nation-building, acceptance of change and a viable urban ecosystem that did not become overtaxed. The first four ideals associated with the social value system, if achieved, would result in the making of a new and better Singaporean with the correct social and work attitudes and such Singaporeans would ensure the economic viability of the country. Maintaining a healthy urban ecosystem

would in turn ensure economic viability because it meant that Singaporeans could avoid the "tragedy of the commons" (Hardin, 1972), a situation where not only individuals would not survive, society as a whole would suffer too.

Singapore has come a long way in its economic development since the first early days of independence. It has done better than merely survive, Singaporeans have achieved a standard of living second only to the Japanese economic giant in Asia. Economic viability is therefore measured currently in terms of excellence and it is only by excelling can Singaporeans win the "second battle for survival". Excellence, in turn, encompasses a range of specific goals: productivity, teamwork and realization of one's potential are just a few. In urban ecosystem terms, the aim is to create a "City of Excellence" and the "First Developed City in the Equatorial Belt" (1989) as well as a model "Environment City" (1990). All these smack of the broader quest for excellence that is tied to survival and economic viability.

So successful is the effort to convince Singaporeans of the necessity to remain economically competitive in order to survive that many actions, including environmental ones, are propelled by economic values. For example, when the Ministry of the Environment increased dumping fees by 33 per cent from 1 April 1991, rubbish contractors suddenly saw the value in recycling and began to sort, grade and re-sell metal frames; salvage plastic waste material like bottles and bags for re-export to recycling plants in Indonesia; salvage and recycle dunnage wood pallets; and recycle rubbish into fertilizers for golf courses (The Straits Times, 17/5/91:25). Similarly, when the price of unleaded petrol was the same as leaded petrol, only 30 per cent of motorists used the unleaded variety. It was only when the price of leaded petrol became more expensive in February 1991 that 55 per cent of motorists switched to unleaded petrol.

The more compelling influence of economic motivation over and above ecological consciousness is best expressed by a Ministry of Environment official who suggested that

> ... if people cannot be persuaded by education, you'll have to reach them where it hurts them the most -- their wallets (The Straits Times, 23/3/91:23).

Apart from the effect of encouraging eco-friendly behaviour, economic success has also provided the wherewithal for Singapore to deal with environmental problems at the national level. In other words, economic development must not be condemned as the unmitigated cause of environmental degradation. This is in contrast to many views which blame pollutive manufacturing plants and resource-exploiting industries as the culprits of negative environmental change. As Professor Tommy Koh (The Straits Times, 20/4/91:23) rightly pointed out, there is no need to "demonise" business and industry because

> It does not follow that to be a conservationist or an environmentalist, you have to be against development, business or industry ... Without the support of business and industry ... we will have a very powerful interest group which will try to block the implementation of whatever we may agree upon.

iii)Cultural adaptation: Ethnic versus institutional culture

A close relationship exists between some cultural values and environmental actions, while other aspects of cultures are less than compelling in explaining environmental behaviour. In trying to understand the cultural factors behind Singapore's attempts at maintaining a viable urban ecosystem, this is a necessary first caveat to bear in mind. In order to flesh out our argument, we need to tease out two notions of culture. At a broad level, culture is often taken as synonymous with the

qualities of being human. We can talk of culture in terms of technologies and science, or in terms of other human attributes, such as the shared basis of social actions, whether this derives from politics (political culture) or economics (for example, a culture of capitalism). At another level, we often associate the term culture in the way anthropologists deal with ethnographies -- culture as in ethnic and religious beliefs, values and activities. Our contention in this paper is that culture in this second sense has had little significant impact on human-environment relationships in Singapore's urban ecosystem, and certainly not at a societal level. Specifically, at this level, environmental actions do not derive from ethnic values and religious teachings. Conversely, if culture is seen at the first broader level, then the influence on human environmental action certainly exists.

Singapore's heterogeneous population is well-known. Ethnically, the population comprises Chinese, Malays, Indians, Eurasians and other minority Asian groups. The major world religions also find significant representation here: Buddhism, Taoism, syncretic "Chinese religion", Islam, Hinduism, Christianity, Sikhism and Judaism. There is therefore no doubt that various ethnic and religious cultures find expression in Singapore's landscape. However, while we grant that on an individual basis religious beliefs can have an influence on the attitudes and relationships towards aspects of nature, at the societal and public level this has not had a major impact. Hindus and Buddhists for example might be vegetarians and Muslims might not eat pork but their religiously motivated taboo dietary practices have not been national political agendas. In cosmopolitan Singapore, where freedom of religious beliefs is politically endorsed, religion is considered a taboo subject in the public political arena. Unlike other countries with state religions, in Singapore the government has categorically stated that religion and politics must be kept separate. This is spelt out in the Maintenance of

Religious Harmony Bill passed in November 1990 where it is explicitly stated that any person using religion for political ends could end up in jail. Given these religious sensitivities in Singapore, any use of religious values to endorse attitudes and behaviour, even if they are environmentally-friendly attitudes and behaviour, is clearly not a viable public option for sustaining ecological policies or programmes.

With regard to 'ethnic' culture, the Singapore perspective is still somewhat ambivalent and under lively public debate. Two schools of thought are manifested in the political arena. The fact that the Members of Parliament of the ruling People's Action Party are divided on this issue clearly indicates that it is a difficult issue to resolve. One school, supported by the Member of Parliament for Serangoon, Lau Teik Soon and former Foreign Minister S. Rajaratnam advocates the need to stress a Singaporean Singapore in which ethnicity (Chinese, Malay, Indian) is de-emphasized for fear that such ethnic consciousness would heighten ethnic tensions and friction between the various ethnic communities. In a rare moment of passion, the former Foreign Minister in his 1990 Deepavali message intoned: "I believe in what I fought for, Singaporean Singapore. I will die believing in a Singaporean Singapore. Whether it is an illusion, I don't care" (The Straits Times, 29/10/90:19).

The other school of thought which the Senior Minister Mr Lee Kuan Yew and Prime Minister Mr Goh Chok Tong subscribe to has it that the rich heritage of Singapore's diverse ethnic communities should be enjoyed and promoted and not suppressed. As the MP for Bedok Dr. Hong Hai argued, "the promotion of ethnic culture is our best insurance for retaining our Asian identity" because waiting 100 years for a Singaporean culture to develop might lead to a cultural takeover led by western influences (The Straits Times, 13/8/90:21).

If our reading of the political situation is correct, the political promotion of ethnic cultures endorses partly the government's interest in furthering the predominant Asian paternalistic tradition. Government leaders have accepted the notion of a paternalistic democracy and the communitarian ideology prevalent in Asian cultures. Such an ideology is diametrically different from many western positions. For example, Professor Lodge, a Harvard Business School professor noted the contrast in ideologies between the United States of America and Singapore. The former is based on individualism, competition and the barest minimum of state planning while in Singapore the government played "a more extensive role as vision setter, planner and consensus maker" (The Straits Times, 8/1/91:40). The enthusiasm for a communitarian ideology has received impetus in the recent White Paper proposal on Shared Values, an attempt to provide an identity for Singaporeans. The government has proposed five values: nation before community and society above self; family as the basic unit of society; community support for the individual; consensus instead of contention; and racial and religious harmony. It is these Asian values and communitarian ideology, now made politically explicit, that the government is encouraging to ensure Singapore's development as a viable urban ecosystem. It recognizes that if the individualistic, competitive, capitalistic laissez-faire system of the US takes over completely in Singapore, we will end up facing a "tragedy of the commons" situation -- each individual for himself and God for us all. The human-environment harmonious equation would never be a reality; we might have enjoyed spectacular economic growth but it would have been done at the expense of environmental degradation and the social disparities between rich and poor would be much wider than it is now. It is this vision that is driving the government in all its ideological promotions, and it is this emphasis on communitarian values that underlie many of the environmental

campaigns.

CONCLUSION

Current international attention and pressure is strongly focused on the deforestation issue, governed by the view that the pristine tropical forest is a global resource and the heritage of all humanity which should therefore not be destroyed. Pressing though the issue is, we contend that some of this attention should also be paid to urban ecosystem problems especially because we predict that the environmental issues for the Southeast Asian region in the twenty-first century are likely to be in the urban sphere. As it is, only 27 per cent of the population in Southeast Asia is classified as "urban", and already the urban ecosystems are finding difficulty coping with the rapidly expanding populations. In the coming decades, the problems are likely to escalate as urban populations balloon without a concomitant improvement of national economic health or industrial vitality of urban areas. It is precisely because of such "pseudo-urbanization" (McGee, 1971) in developing countries that their urban centres have not had the wherewithall to cope with their exacerbating problems. This is in contrast to the West where urbanization reflected the increasing mechanization of agriculture and the industrial revolution. Seen in this light, we accept McGee's (1971) thesis that cities reflect changes in the wider socio-economic system rather than act as catalysts for socio-economic change. Extending this thesis, we would argue that cities also reflect the health and wealth of the wider ecosystem (hinterland) in which they are situated. If the hinterlands are poor and enveloped in environmental problems, the cities are likely to follow the same fate. Given such a scenario, Southeast Asian cities face an imperative need to get their eco-logic right. Otherwise, they could be witnesses, or worse, victims of the urban ecological malaise and disasters currently engulfing

other cities around the world.

We have been insulated in Singapore by some of the pressing environmental problems because as a global city we have derived our basic necessities from a varied international hinterland. But as is well-known, our gut subsistent supplies of water and food come essentially from the region. Indeed, 60 percent of our water supplies come from Malaysia, while a large proportion of our staple food (100 per cent rice), vegetables (95 per cent) and meats (all meats except for poultry) are imported, a large part from Thailand, Malaysia and Indonesia. We are therefore not completely spared from the problems of our neighbouring ecosystems. If they are disrupted, Singapore's survival will be severely threatened. The warning by a Malaysian academic Professor K.T. Joseph that Malaysia will face an acute shortage of water by 2020 due to its current liberal and indiscriminate logging practices (Savage and Huang, 1992:5) will certainy have serious repercussions for Singapore.

As we have shown in this paper, the Singapore government is mindful of the many potential and real problems and have taken steps to curtail and/or anticipate them. They have been well-motivated by the alternative scenario which could easily have been our fate if negative feedback mechanisms in our ecosystem had been allowed to operate. These negative feedback mechanisms would have translated into stark ecological realities: state survival and the life and death of its citizens. The region's cities of the twenty-first century are likely to be confronted with this scenario if no heed is taken of the many signals. They can easily become death houses -- the scenes of chronic illnesses, starvation, poverty, smog, environmental degradation, and social problems.

Several lessons can be learnt from Singapore in anticipation of the impending crisis. Singapore's success in landscape transformation -- slum and squatter clearance, the construction of affordable homes for a vast majority of the population, the establishment of a 'green' industrial estate in the form of Jurong which is at once economically viable and environmentally friendly -- has already attracted the attention of other planners and administrators who look to emulate some of the policies and methods of implementation. However, while changes have successfully occurred in physical terms, the mental attitudes of people have not altered commensurately. As we have shown, the viable urban ecosystem has resulted not because individuals are motivated by their ethnic or religious cultures which are ecologically friendly. Instead, Singapore's case shows the importance of political enlightenment and institutional direction. We contend that while individuals can respond, react and adapt to their own environments, the long term sustained relationships with the environment cannot be left to individual judgements and actions. When we deal with highly concentrated large populations in urban nodes interacting with complex ecosystems, the onus of maintaining harmonious human-environment relationships cannot be left to ad-hoc, spontaneous individual actions. The human adaptation to complex urban ecosystems demand that people come together as a polity to deal categorically with their habitat needs and problems (Hawley, 1986:102). Good leadership and government is necessary to steer and mobilize the polity to ensure a sustainable environment. The urban ecosystem afterall is characterized by both "natural and social/ institutional control mechanisms, with the latter becoming increasingly predominant" (Stearns & Montag, 1974:30).

At a very pragmatic level, Professor Tommy Koh, Singapore's Ambassador-at-large, has articulated this need for commitment by the leadership. Urging heads of

government and state to show support to the United Nations Conference on Environment and Development in June 1992 in Rio de Janeiro by their attendance, he argued that only when there is a fundamental change in thinking at the top is it possible for environmental considerations to be worked into development policies and for economic progress to be balanced with the need to protect the earth (The Straits Times, 20/4/91:23). Unfortunately in many Third World urban scenarios, there has been an amorphous and plural polity, fragmented by ethnic, religious and class cleavages; there has also been a lack of political commitment, strong leadership and hence direction. As a result, the fragmented and individualistic human activities are often out of sync with the urban environment, giving rise to the inevitable problems of environmental degradation. In the decades to come, with population agglomerations in Southeast Asian cities likely to exceed five million, ecosystem problem-solving might well extend beyond the existing economic abilities and administrative capabilities of many states of the region. What must not also be lacking is political will.

APPENDIX 1: SOME LEGISLATION RELEVANT TO SINGAPORE'S ENVIRONMENT

Clean Air Act, 1971

Clean Air Act (Amendment), 1975 (Better control of air pollution and more effective enforcement)

Clean Air Act (Amendment of Schedule) Notification, S. 127/1980 (Stricter control of the storage of toxic and volatile substances)

Clean Air (Standards) Regulations. S.14/1972 (Allowable emission limits set for various industrial pollutants)

Clean Air (Standards) (Amendment) Regulations, S.43/1978 (Stricter control over the emission of certain air pollutants)

Clean Air (Prohibition on the use of open fires) Order, S.38/1973

Environmental Public Health Act, 1968

Environmental Public Health (Hawkers) Regulations, 1969

Environmental Public Health (Markets) Regulations, 1969

Environmental Public Health (Public Cleansing) Regulations, 1970

Environmental Public Health (Food Handlers) Regulations, 1973

Environmental Public Health (Food Establishments) Regulations, 1973

Environmental Public Health (Funeral Parlours) Regulations, 1973

Environmental Public Health (Crematoria) Regulations, 1973

Environmental Public Health (Cemeteries) Regulations, 1978

Environmental Public Health (Swimming Pools) Regulations, 1979

Factories Act, 1973

Motor Vehicles (Construction and Use) Rules, S.345/1974

Nature Reserves Act, 1959

Parks and Trees Act, 1975

Parks and Trees Rules, 1983

Port of Singapore Authority Act, 1971?

Prevention of Pollution of the Sea Act, 1971

Prevention of Pollution of the Sea (Amendment) Act, 1976

Prevention of Pollution of the Sea Regulations, S.254/1976 (Oil refineries to keep an adequate stock of readily usable dispersants for combating pollution)

Prevention of the Pollution of the Sea (Amendment) Regulations, S.320/1983 (Tug boats also have to keep a stock of radily usable dispersants)

Prohibition on Smoking in Certain Places Act, 1970

Public Utilities (Catchment Area Parks) Regulations, S.33/1972

Radiation Protection Act, 1973

Water Pollution Control and Drainage Act, 1975

Sanitary Appliances and Water Charges Regulations, 1975

Trade Effluent Regulations, 1976

Sanitary Plumbing and Drainage System Regulations, 1976

Sewage Treatment Plants Regulations, 1976

Surface Water Drainage Regulations, 1976

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Caption for Figure 1

The "Green and Blue Plan" as envisaged in Singapore's (1991) Concept Plan

ABSTRACT

Cities are complex ecosystems and all over the world, they are increasingly confronted with environmental problems such as air pollution, acid rain, smog, water shortages and garbage disposal. It is our contention in this paper that there can be no solutions to these urban ecosystem problems unless the issues are adopted by national governments and urban administrations. We use Singapore as a case study to illustrate how urban development and successful environmental management can occur concurrently precisely because of the presence of enlightened elites and decision makers and firm government.

In particular, we focus in this paper on the urban environmental experiences of Singapore. The nature of environmental changes in the post-Independence years are examined, including the cleaning up and greening of landscapes, the urban planning and resultant transformation to a built-up landscape, and the increasing concern with conservation of the landscape, both natural and historical. We argue that all this has been practically feasible because of the continuing social education and engineering of social behaviour and attitudes regarding environmental issues through mass media, campaigns and legal binds.

What lies at the continuing efforts at social education and engineering? We argue that they stem from a political elite which recognises the constraints facing Singapore and the need to deal with them at national level. Specifically, the government in Singapore has recognised the spatial constraints of an island-state and the dangers of a burgeoning population, particularly in relation to the need to sustain a viable urban ecosystem. They have therefore been conscientious in planning and population control. They have also stressed the importance of remaining economically

viable in order to survive and an entire survival and excellence ethos has been inculcated in Singaporeans. This has been translated in urban planning and environmental management terms to mean creating and sustaining a "City of Excellence" that is at the same time a model "Environment City". Above all, they have attempted to inculcate in Singaporeans a communitarian ideology that emphasises Asian notions of nation before community and society above self. It is hoped that such an ideology would, amongst other things, prevent a "tragedy of the commons" situation.